

2004

DRINKING WATER SURVEILLANCE PROGRAM

**HAWKESBURY
WATER TREATMENT
PLANT**

ANNUAL REPORT 1990

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

HAWKESBURY WATER TREATMENT PLANT 1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Hawkesbury water treatment plant is a conventional treatment plant which treats water from the Ottawa River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, post pH adjustment, fluoridation and disinfection. This plant has a rated capacity of $12.3 \times 1000 \text{ m}^3/\text{day}$. The Hawkesbury water treatment plant serves a population of approximately 9,700.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

The health related guideline for turbidity was exceeded in 2 treated water samples. The District Officer was notified.

The Hawkesbury water treatment plant, for the sample year 1990, produced acceptable quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A " " INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAM		TREATED		SITE 1		SITE 2	
	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE
BACTERIOLOGICAL	18	16	88	6	2	33	12	2	16	12
CHEMISTRY (FLO)	41	41	100	70	70	100	140	137	97	135
CHEMISTRY (LAB)	233	200	85	233	188	80	398	361	90	398
METALS	288	97	33	288	88	30	529	207	39	552
CHLOROCARBOXIC ACIDS	140	0	0	154	0	0	140	0	0	140
CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0
PAH	168	0	0	168	0	0	17	0	0	17
PESTICIDES & PCB	368	0	0	389	1	0	212	0	0	212
PHENOLICS	12	5	41	12	4	33	0	0	0	0
SPECIFIC PESTICIDES	60	0	0	61	0	0	10	0	0	10
VOLATILES	348	0	0	348	34	9	319	31	9	348
TOTAL	1688	359	1741	387	1777	738	1824	754		

DRINKING WATER SURVEILLANCE PROGRAM

HAWKESBURY WATER TREATMENT PLANT 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Hawkesbury water treatment plant in the Spring of 1989. A previous annual report was published for 1989.

PLANT DESCRIPTION

The Hawkesbury water treatment plant is a conventional treatment plant which treats water from the Ottawa River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, post pH adjustment, fluoridation and disinfection. This plant has a rated capacity of $12.3 \times 1000 \text{ m}^3/\text{day}$. The Hawkesbury water treatment plant serves a population of approximately 9,700.

The sample day flows ranged from $10.4 \times 1000 \text{ m}^3/\text{day}$ to $14.6 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the

plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500 counts/mL in 3 of 36 treated and distributed water samples with a maximum reported value of 2,400 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 15 of 34 treated and distributed water samples with a maximum reported value of 23.4°C.

Protocol for turbidity states that laboratory and field measurements should be made within 48 hours. This is not always achieved except when measured in the field, therefore, the field turbidity values are considered more reliable.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

Field turbidity exceeded the ODWO Maximum Acceptable Concentration of 1.0 Formazin Turbidity Units in 2 of 12 treated water samples with a maximum reported value of 1.9 FTU. The District Officer was notified on both occasions.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 Hazen Units (HZU) in 8 of 33 treated and distributed water samples with a maximum reported value of 9.5 HZU.

Total ammonium exceeded the European Economic Community Aesthetic Guideline Level of 0.05 mg/L in 1 of 22 distribution water samples with a reported value of 0.07 mg/L.

Laboratory turbidity exceeded the Maximum Acceptable Concentration in 1 of 12 treated water samples with a reported value of 1.7 FTU. This result was confirmed by the corresponding field turbidity value which is considered more reliable.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 20 of 35 treated and distributed water samples with a maximum reported value of 710.0 ug/L.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was detected at positive levels in 1 of 7 treated and distributed water samples with a reported value of 65 ng/L. The United States Environmental Protection Agency has an Ambient Water Quality Criteria of 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected in the treated or distributed water.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

Methylene chloride (dichloromethane) was found at positive levels in 1 treated water sample with a reported value of 19.5 ug/L. This was below the ODWO Maximum Acceptable Concentration of 50 ug/L.

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in 32 of the 35 treated and distributed water samples analyzed. The maximum observed level was 94.6 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

Unusually low levels of THMs were detected in the April treated and distributed water samples. Low levels of THMs were also detected in April 1989. This is thought to be caused by the reaction of ammonia, which is naturally high in the raw water during the spring run-off, with the chlorine disinfectant forming a combined chlorine residual. Free chlorine is therefore not available to react with the organic precursors to form trihalomethanes. This appears to be an annual event.

CONCLUSIONS

The Hawkesbury water treatment plant, for the sample year 1990, produced acceptable quality water and this was maintained in the distribution system.

The health related guideline for turbidity was exceeded in 2 treated water samples. The District Officer was notified.

FIGURE 1

HAWKESBURY WTP

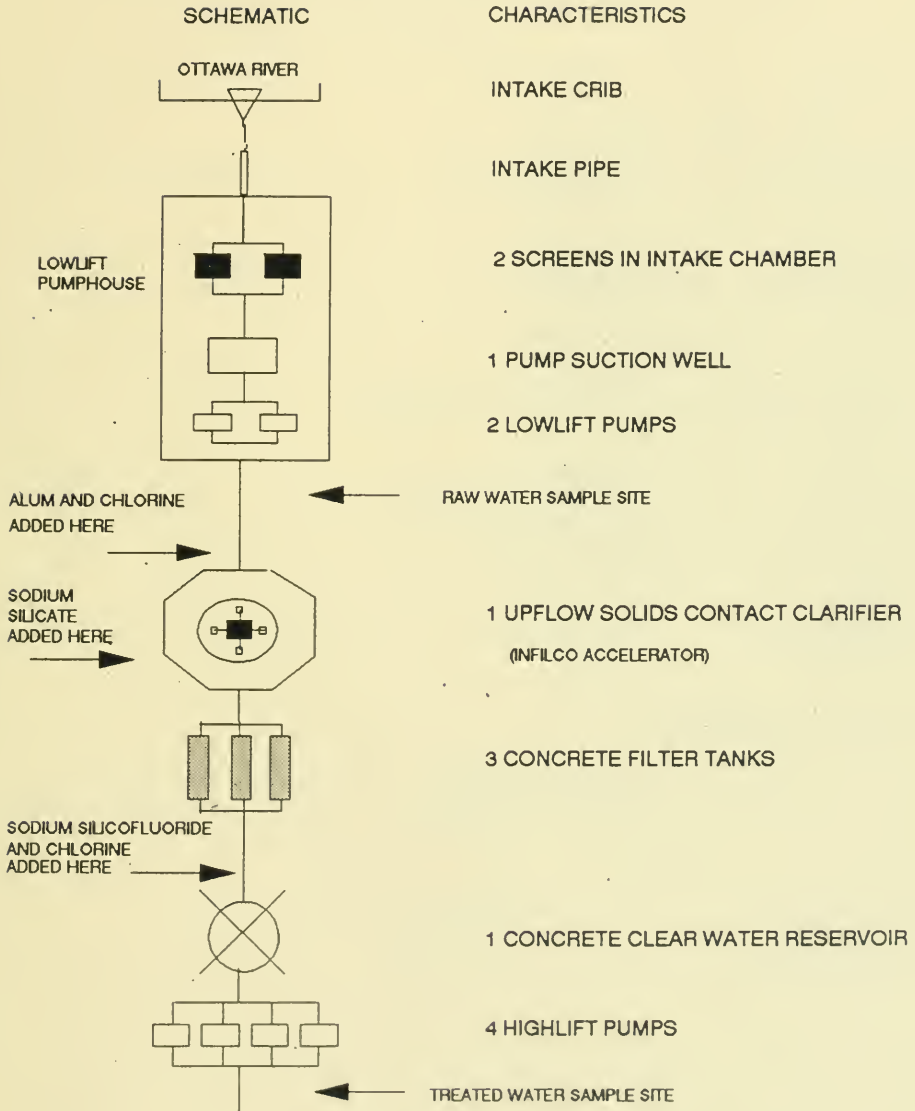


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

WORKS #: 220002832
PLANT NAME: HAWKESBURY WTP

DISTRICT: CORNWALL
REGION: SOUTHEAST
DISTRICT OFFICER: M. HOLY

UTM #: 185295005051645

PLANT SUPERINTENDENT: RICHARD GUERTAIN

ADDRESS: 670 MAIN ST W
HAWKESBURY, ONTARIO
K6A 1V9
(613) 632-0105

MUNICIPALITY: HAWKESBURY
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	15.890	(X 1000 M3/DAY)
RATED CAPACITY:	12.300	(X 1000 M3/DAY)

MUNICIPALITY

HAWKESBURY

POPULATION

9,666

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
ALUMINUM	TREATED WATER IN LAB SETTLED WATER IN LAB	DAILY DAILY
FREE CHLORINE RESIDUAL	TREATED WATER IN LAB	TWICE DAILY
COLOUR	TREATED WATER IN LAB RAW WATER IN LAB	TWICE DAILY TWICE DAILY
TOTAL CHLORINE RESIDUAL	TREATED WATER	CONTINUOUS
FLUORIDE	TREATED WATER IN LAB TREATED WATER	TWICE DAILY CONTINUOUS
PH	TREATED WATER IN LAB FILTERED WATER IN LAB RAW WATER IN LAB	TWICE DAILY TWICE DAILY TWICE DAILY
TEMPERATURE	TREATED WATER IN LAB RAW WATER IN LAB	TWICE DAILY TWICE DAILY
TURBIDITY	TREATED WATER IN LAB FILTERED WATER IN LAB AFTER FILTERS RAW WATER IN LAB	TWICE DAILY TWICE DAILY CONTINUOUS TWICE DAILY

TABLE 3
ORINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP SAMPLE DAY CONDITIONS FOR 1990

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	TREATMENT CHEMICAL DOSAGE (MG/L)		COAGULATION AID	FLUORIDATION	POST PH ADJUSTMENT		POST CHLORINATION
			ALUM LIQUID	CHLORINE			SODIUM SILICATE	SODIUM SILICOFLUORIDE		CALCIUM CARBONATE	CHLORINE
JAN 09	4.20	13.546	31.10		.96	1.11	11.70		1.03
FEB 13	3.33	11.227	32.90		1.99	1.04	15.00		1.78
MAR 13	3.22	10.591	32.90		1.99	1.14	13.15		1.42
APR 10	3.23	10.682	43.60		1.99		12.00		.94
MAY 15	6.21	11.909	35.00		.80	1.10	13.10		.80
JUN 12	6.07	12.364	32.20			.68	15.00		1.21
JUL 11	6.00	12.464	27.80		1.00	1.10	15.60		.80
AUG 14	5.12	14.591	26.00			1.15	13.76		1.58
SEP 11	6.03	12.500	25.70	.91	1.00	1.23	16.04		1.09
OCT 10	7.15	10.409	32.90	.25	.64	1.00	10.86		1.19
NOV 14	6.42	11.227	39.30		1.27	1.00	14.00		1.83
DEC 11	5.56	12.727	34.68		1.44	1.29	13.29		1.18

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	6	5	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	6	2	0	12	2	0	12	9	0
TOTAL COLIFORM MF	6	5	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	16	0	6	2	0	12	2	0	12	9	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	2	2	0	11	11	0	24	22	0	24	11	0
FLD CHLORINE FREE	2	2	0	12	12	0	24	23	0	24	24	0
FLD CHLORINE (TOTAL)	2	2	0	12	12	0	24	24	0	24	24	0
FLD PH	12	12	0	12	12	0	24	24	0	24	24	0
FLD TEMPERATURE	12	12	0	12	12	0	22	22	0	21	21	0
FLD TURBIDITY	11	11	0	11	11	0	22	22	0	18	18	0
*TOTAL SCAN CHEMISTRY (FLD)	41	41	0	70	70	0	140	137	0	135	122	0
CHEMISTRY (LAB)												
ALKALINITY	11	11	0	11	11	0	22	22	0	22	22	0
CALCIUM	11	11	0	11	11	0	22	22	0	22	22	0
CYANIDE	12	0	0	12	0	0	.	.	.	.	.	.
CHLORIDE	11	11	0	11	11	0	22	22	0	22	22	0
COLOUR	11	11	0	11	11	0	22	22	0	22	22	0
CONDUCTIVITY	11	11	0	11	11	0	22	22	0	22	22	0
DISS ORG CARBON	11	11	0	11	11	0	22	22	0	22	22	0
FLUORIDE	11	5	6	11	11	0	22	22	0	22	22	0
HARDNESS	11	11	0	11	11	0	22	22	0	22	22	0
IONCAL	12	11	0	12	11	0	24	22	0	24	22	0
LANGELIERS INDEX	0	0	0	0	0	0	0	0	0	0	0	0
MAGNESIUM	11	11	0	11	11	0	22	22	0	22	22	0
SODIUM	11	11	0	11	11	0	22	22	0	22	22	0
AMMONIUM TOTAL	11	5	3	11	0	4	22	6	9	22	3	5
NITRITE	11	10	1	11	2	7	22	3	15	22	3	15
TOTAL NITRATES	11	11	0	11	11	0	22	22	0	22	22	0
NITROGEN TOT KJELD	11	10	0	11	10	0	22	22	0	22	22	0
PH	11	11	0	11	11	0	22	22	0	22	22	0
PHOSPHORUS FIL REACT	11	6	5	11	7	3	.	.	.	.	.	.
PHOSPHORUS TOTAL	11	10	0	11	4	5	.	.	.	.	.	.
SULPHATE	11	11	0	11	11	0	22	22	0	22	22	0
TURBIDITY	11	11	0	11	11	0	22	22	0	22	22	0
*TOTAL SCAN CHEMISTRY (LAB)	233	200	15	233	188	19	398	361	24	398	358	20

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE

METALS												
SILVER	12	0	0	12	0	0	23	0	1	24	0	1
ALUMINUM	12	12	0	12	12	0	23	23	0	24	24	0
ARSENIC	12	0	12	12	0	10	23	0	18	24	0	23
BARIUM	12	12	0	12	12	0	23	23	0	24	24	0
BORON	12	0	12	12	0	12	23	0	23	24	0	24
BERYLLIUM	12	0	0	12	0	0	23	0	0	24	0	0
CADMIUM	12	0	1	12	0	1	23	0	1	24	0	5
COBALT	12	0	11	12	0	11	23	0	20	24	0	20
CHROMIUM	12	0	8	12	0	8	23	0	13	24	0	8
COPPER	12	0	12	12	0	12	23	22	1	24	24	0
IRON	12	12	0	12	2	10	23	8	15	24	12	12
MERCURY	12	0	2	12	0	2	.	.	.	.	.	.
MANGANESE	12	12	0	12	12	0	23	23	0	24	24	0
MOLYBDENUM	12	0	12	12	0	12	23	0	23	24	1	23
NICKEL	12	1	11	12	0	4	23	3	11	24	2	11
LEAD	12	2	10	12	1	8	23	11	12	24	16	8
ANTIMONY	12	0	12	12	1	11	23	2	21	24	9	15
SELENIUM	12	0	0	12	0	0	23	0	0	24	0	0
STRONTIUM	12	12	0	12	12	0	23	23	0	24	24	0
TITANIUM	12	12	0	12	12	0	23	23	0	24	24	0
THALLIUM	12	0	0	12	0	0	23	0	0	24	0	0
URANIUM	12	0	12	12	0	0	23	0	0	24	0	0
VANADIUM	12	10	2	12	12	0	23	23	0	24	23	1
ZINC	12	12	0	12	12	0	23	23	0	24	24	0

*TOTAL SCAN METALS	288	97	117	288	88	101	529	207	159	552	231	151
*TOTAL GROUP INORGANIC & PHYSICAL	562	338	132	591	346	120	1067	705	183	1085	711	171

CHLOROAROMATICS												
HEXACHLOROBUTADIENE	10	0	0	11	0	0	10	0	0	10	0	0
123 TRICHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
1234 T-CHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
1235 T-CHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
124 TRICHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
1245 T-CHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
135 TRICHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
HCB	10	0	0	11	0	0	10	0	0	10	0	0
HEXACHLOROETHANE	10	0	0	11	0	0	10	0	0	10	0	0
OCTACHLOROSTYRENE	10	0	0	11	0	0	10	0	0	10	0	0
PENTACHLOROBENZENE	10	0	0	11	0	0	10	0	0	10	0	0
236 TRICHLOROTOLUENE	10	0	0	11	0	0	10	0	0	10	0	0
245 TRICHLOROTOLUENE	10	0	0	11	0	0	10	0	0	10	0	0
26A TRICHLOROTOLUENE	10	0	0	11	0	0	10	0	0	10	0	0

*TOTAL SCAN CHLOROAROMATICS	140	0	0	154	0	0	140	0	0	140	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS												
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	10	0	4	10	0	0	1	0	0	1	0	0
ANTHRACENE	9	0	0	9	0	0	1	0	0	1	0	0
FLUORANTHENE	10	0	0	10	0	0	1	0	0	1	0	0
PYRENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(A)ANTHRACENE	10	0	0	10	0	0	1	0	0	1	0	0
CHRYSENE	10	0	0	10	0	0	1	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	9	0	0	9	0	0	1	0	0	1	0	0
BENZO(E) PYRENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(B) FLUORANTHEN	10	0	0	10	0	0	1	0	0	1	0	0
PERYLENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(K) FLUORANTHEN	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(A) PYRENE	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(G,H,I) PERYLEN	10	0	0	10	0	0	1	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	10	0	0	10	0	0	1	0	0	1	0	0
INDENO(1,2,3-C,D) PY	10	0	0	10	0	0	1	0	0	1	0	0
BENZO(B) CHRYSENE	10	0	0	10	0	0	1	0	0	1	0	0
CORONENE	10	0	0	10	0	0	1	0	0	1	0	0
*TOTAL SCAN PAH	168	0	4	168	0	0	17	0	0	17	0	0
PESTICIDES & PCB												
ALDRIN	10	0	0	11	0	0	10	0	0	10	0	0
ALPHA BHC	10	0	2	11	0	4	10	0	3	10	0	1
BETA BHC	10	0	0	11	0	0	10	0	0	10	0	0
LINDANE	10	0	0	11	0	0	10	0	0	10	0	0
ALPHA CHLORDANE	10	0	0	11	0	0	10	0	0	10	0	0
GAMMA CHLORDANE	10	0	0	11	0	0	10	0	0	10	0	0
DIELDRIN	10	0	0	11	0	0	10	0	0	10	0	0
METHOXYCHLOR	10	0	0	11	0	0	10	0	0	10	0	0
ENDOSULFAN I	10	0	0	11	0	0	10	0	0	10	0	0
ENDOSULFAN II	10	0	0	11	0	0	10	0	0	10	0	0
ENDRIN	10	0	0	11	0	0	10	0	0	10	0	0
ENDOSULFAN SULPHATE	10	0	0	11	0	0	10	0	0	10	0	0
HEPTACHLOR EPOXIDE	10	0	0	11	0	0	10	0	0	10	0	0
HEPTACHLOR	10	0	0	11	0	0	10	0	0	10	0	0
MIREX	10	0	0	11	0	0	10	0	0	10	0	0
OXYCHLORDANE	10	0	0	11	0	0	10	0	0	10	0	0
OPDDT	10	0	0	11	0	0	10	0	0	10	0	0
PCB	10	0	0	11	0	0	10	0	0	10	0	0
DDD	10	0	0	11	0	0	10	0	0	10	0	0
PPDDE	10	0	0	11	0	0	10	0	0	10	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	10	0	0	11	0	0	10	0	0	10	0	0
AMETRINE	12	0	0	12	0	0	.	.	.	.	.	.
ATRAZINE	12	0	2	12	0	1	.	.	.	.	.	.
ATRAZONE	12	0	0	12	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	12	0	0	12	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	12	0	0	12	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	11	0	0	11	0	0	.	.	.	.	.	.
PROMETONE	12	0	0	12	0	0	.	.	.	.	.	.
PROPACINE	12	0	0	12	0	0	.	.	.	.	.	.
PROMETRYNE	12	0	0	12	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	12	0	0	12	0	0	.	.	.	.	.	.
SIMAZINE	12	0	0	12	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	12	0	0	12	0	0	.	.	.	.	.	.
METOLACHLOR	12	0	0	12	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	1	1	2	0	1	2	0	1
*TOTAL SCAN PESTICIDES & PCB 368		0	4	389	1	6	212	0	4	212	0	2

PHENOLICS												
PHENOLICS	12	5	3	12	4	6	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	12	5	3	12	4	6	0	0	0	0	0	0

SPECIFIC PESTICIDES												
TOXAPHENE	10	0	0	11	0	0	10	0	0	10	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALATE	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	60	0	0	61	0	0	10	0	0	10	0	0

VOLATILES												
BENZENE	12	0	0	12	0	1	11	0	1	12	0	1
TOLUENE	12	0	1	12	0	2	11	0	0	12	0	0
ETHYLBENZENE	12	0	0	12	0	7	11	0	6	12	0	7
P-XYLENE	12	0	0	12	0	1	11	0	0	12	0	0
M-XYLENE	12	0	0	12	0	0	11	0	0	12	0	0
O-XYLENE	12	0	1	12	0	1	11	0	1	12	0	0
STYRENE	12	0	2	12	0	9	11	0	9	12	0	10
1,1 DICHLOROETHYLENE	12	0	0	12	0	0	11	0	0	12	0	0
METHYLENE CHLORIDE	12	0	0	12	1	0	11	0	0	12	0	0
1,1,2 DICHLOROETHYLENE	12	0	0	12	0	0	11	0	0	12	0	0
1,1 DICHLOROETHANE	12	0	0	12	0	0	11	0	0	12	0	0
CHLOROFORM	12	0	10	12	11	1	11	11	0	12	12	0
111, TRICHLOROETHANE	12	0	1	12	0	1	11	0	0	12	0	0
1,2 DICHLOROETHANE	12	0	0	12	0	0	11	0	0	12	0	0
CARBON TETRACHLORIDE	12	0	0	12	0	0	11	0	0	12	0	0
1,2 DICHLOROPROPAE	12	0	0	12	0	0	11	0	0	12	0	0
TRICHLOROETHYLENE	12	0	0	12	0	0	11	0	0	12	0	0
DICHLOROBROMOMETHANE	12	0	0	12	11	0	11	10	1	12	11	1
112 TRICHLOROETHANE	12	0	0	12	0	0	11	0	0	12	0	0
CHLORODIBROMOMETHANE	12	0	0	12	0	1	11	0	3	12	0	2
T-CHLOROETHYLENE	12	0	1	12	0	0	11	0	3	12	0	3
BROMOFORM	12	0	0	12	0	0	11	0	0	12	0	0
1122 T-CHLOROETHANE	12	0	0	12	0	0	11	0	0	12	0	0
CHLOROBENZENE	12	0	0	12	0	0	11	0	0	12	0	0
1,4 DICHLOROBENZENE	12	0	0	12	0	1	11	0	1	12	0	0
1,3 DICHLOROBENZENE	12	0	0	12	0	0	11	0	0	12	0	0
1,2 DICHLOROBENZENE	12	0	0	12	0	0	11	0	0	12	0	0
ETHYLENE DIBROMIDE	12	0	0	12	0	0	11	0	0	12	0	0
TOTL TRIHALOMETHANES	12	0	1	12	11	0	11	10	1	12	11	1
*TOTAL SCAN VOLATILES	348	0	17	348	34	25	319	31	26	348	34	25
*TOTAL GROUP ORGANIC	1108	5	28	1144	39	37	698	31	30	727	34	27

KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
ICS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR Unreliable: Could Not Confirm By Reanalysis
UCS Unreliable: Contamination Suspected
UIN Unreliable: Indeterminate Interference
XP Positive After X Number Of Hours
T# (T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2			
		STANDING		FREE FLOW		STANDING		FREE FLOW	

BACTERIOLOGICAL									
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)					
JAN	556	.	.	.	.	.	.	.	.
FEB	80	.	.	.	.	.	.	.	.
JUL	36	.	.	.	.	.	.	.	.
AUG	801	.	.	.	.	.	.	.	.
OCT	308	.	.	.	.	.	.	.	.
DEC	88	.	.	.	.	.	.	.	.

STANDRD PLATE CNT MF (COUNT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)					
JAN	.	7 <=>	.	3 <=>	.	6 <=>	.		
FEB	.	2 <=>	.	0 <=>	.	0 <=>	.		
MAR	.	.	.	3 <=>	.	19	.		
APR	.	.	.	1 <=>	.	13	.		
MAY	.	.	.	2 <=>	.	47	.		
JUN	.	.	.	2 <=>	.	650	.		
JUL	.	2400 >	.	31	.	93	.		
AUG	.	37	.	2400 >	.	130	.		
SEP	.	.	.	2 <=>	.	220	.		
OCT	.	0 <=>	.	3 <=>	.	6 <=>	.		
NOV	.	.	.	1 <=>	.	15	.		
DEC	.	1 <=>	.	0 <=>	.	31	.		

TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)					
JAN	11200	.	.	.	.	.	.	.	.
FEB	1420	.	.	.	.	.	.	.	.
JUL	360	.	.	.	.	.	.	.	.
AUG	10 <=>	.	.	.	.	.	.	.	.
OCT	930	.	.	.	.	.	.	.	.
DEC	1800	.	.	.	.	.	.	.	.

T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A					
JAN	9500	.	.	.	.	.	.	.	.
FEB	7000	.	.	.	.	.	.	.	.
JUL	24000 >	.	.	.	.	.	.	.	.
AUG	24000	.	.	.	.	.	.	.	.
OCT	4400	.	.	.	.	.	.	.	.
DEC	2800	.	.	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	.	.100	.200	.100	.100
FEB	.	.300	.200	.200	.100	.100
MAR	.	.290	.100	.150	.000	.000
APR	.	.200	.100	.200	.100	.100
MAY	.	.160	.150	.100	.000	.000
JUN	.	.170	.150	.100	.000	.000
JUL	.020	.120	.100	.050	.000	.000
AUG	.	.160	.100	.100	.000	.100
SEP	.	.110	.100	.130	.000	.000
OCT	.	.100	.100	.150	.000	.000
NOV	.	.110	.000	.100	.100	.100
DEC	.040	.180	.000	.100	.100	.100
FLD CHLORINE FREE (MG/L)						
			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	.400	.200	.150	.100	.100
FEB	.	.100	.150	.150	.100	.100
MAR	.	.340	.150	.100	.100	.100
APR	.	.300	.250	.050	.100	.100
MAY	.	.340	.150	.250	.100	.100
JUN	.	.310	.050	.250	.100	.100
JUL	.050	.160	.050	.000	.100	.100
AUG	.	.310	.150	.250	.100	.100
SEP	.	.570	.150	.150	.130	.120
OCT	.	.540	.150	.200	.100	.100
NOV	.	.290	.250	.250	.100	.100
DEC	.140	.430	.250	.250	.100	.100
FLD CHLORINE (TOTAL) (MG/L)						
			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	.400	.300	.350	.200	.200
FEB	.	.400	.350	.350	.200	.200
MAR	.	.630	.250	.250	.100	.100
APR	.	.500	.350	.250	.200	.200
MAY	.	.500	.300	.350	.100	.100
JUN	.	.480	.200	.350	.100	.100
JUL	.030	.280	.150	.050	.100	.100
AUG	.	.470	.250	.350	.100	.200
SEP	.	.680	.250	.280	.130	.120
OCT	.	.640	.250	.350	.100	.100
NOV	.	.400	.250	.350	.200	.200
DEC	.180	.610	.250	.350	.200	.200
FLD PH (DMNSLESS)						
			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JAN	7.100	7.300	6.950	7.000	7.000	7.000
FEB	7.400	7.400	6.900	6.900	7.000	7.000
MAR	6.390	7.100	7.100	7.250	7.000	7.000
APR	7.800	7.700	7.450	7.300	7.000	7.000
MAY	7.220	7.050	7.300	7.350	7.200	7.200
JUN	7.190	7.180	7.300	7.150	7.200	7.200
JUL	6.750	7.140	7.150	7.200	7.200	7.000
AUG	7.130	8.010	7.500	7.350	7.400	7.300
SEP	6.990	7.430	7.350	7.350	7.400	7.400
OCT	7.210	7.370	7.300	7.350	7.200	7.200
NOV	7.520	7.900	7.550	7.500	7.200	7.000
DEC	7.320	8.210	7.350	7.450	7.200	7.200

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

SITE 2

STANDING

FREE FLOW

STANDING

FREE FLOW

FLD TEMPERATURE (DEG.C)

DET'N LIMIT = N/A

GUIDELINE = 15 (A3)

JAN	1.000	3.000	5.000	2.000	7.500	1.500
FEB	.100	.200	6.000	2.000	5.500	1.500
MAR	.900	1.900	4.000	1.000	.	3.000
APR	2.000	3.000	6.500	3.500	5.500	2.500
MAY	12.200	11.900	12.000	11.200	15.000	12.000
JUN	16.400	16.400	16.100	15.900	17.500	15.500
JUL	21.000	21.400	20.000	21.500	21.000	20.000
AUG	23.200	23.400	22.500	22.500	21.500	21.000
SEP	19.700	20.000	22.000	21.800	22.000	21.500
OCT	13.900	15.600	18.500	17.000	18.500	17.000
NOV	6.100	4.500	.	.	14.000	9.500
DEC	3.400	.800	9.000	3.000	.	.

FLD TURBIDITY (FTU)

DET'N LIMIT = N/A

GUIDELINE = 1 (A1)

JAN	2.000	1.900	3.000	2.200	.	.
FEB	2.100	.650	1.000	.790	1.020	.750
MAR	1.900	.500	.620	.330	.340	.330
APR	2.500	.360	.460	.310	.610	.320
JUN	3.200	.140	.430	.210	.210	.180
JUL	3.400	.120	.220	2.400	.170	2.500
AUG	3.300	.660	.260	.200	.470	.220
SEP	1.700	.100	.110	.100	.100	.100
OCT	2.100	.160	.200	.180	.190	.140
NOV	6.300	1.200	.470	.600	.390	.350
DEC	6.000	.520	.700	.600	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)				DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)	
ALKALINITY (MG/L)							
JAN	22.600	25.400	24.400	24.100	24.500	24.000	
FEB	29.600	30.800	27.800	27.100	28.700	28.100	
MAR	30.600	29.300	33.400	33.200	32.300	32.200	
APR	!LA	!LA	!LA	!LA	!LA	!LA	
MAY	28.900	26.000	30.000	28.300	28.600	28.800	
JUN	21.800	22.300	22.200	21.600	22.700	22.400	
JUL	18.900	19.300	23.800	21.300	22.900	21.000	
AUG	29.000	28.900	25.600	27.100	29.700	29.800	
SEP	20.000	22.300	23.400	23.900	23.700	23.500	
OCT	28.500	28.900	29.000	31.100	28.500	28.700	
NOV	28.700	28.700	29.700	29.600	28.900	28.900	
DEC	27.500	28.600	28.100	27.800	27.900	27.300	
CALCIUM (MG/L)				DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)	
JAN	11.300	18.800	18.900	18.400	18.700	18.700	
FEB	12.400	19.400	18.200	17.800	18.200	17.600	
MAR	12.400	18.400	20.000	20.800	20.400	20.400	
APR	!LA	!LA	!LA	!LA	!LA	!LA	
MAY	11.000	16.900	18.000	17.900	18.100	17.500	
JUN	8.800	16.200	16.400	16.400	16.600	16.200	
JUL	9.600	15.200	17.400	16.000	16.600	15.600	
AUG	12.600	16.700	16.000	15.800	16.100	15.900	
SEP	7.500	15.000	15.200	15.500	15.200	15.500	
OCT	11.400	17.700	18.600	18.600	18.100	18.700	
NOV	11.600	17.600	17.400	16.800	17.600	16.800	
DEC	10.200	17.000	16.800	17.400	17.800	17.200	
CHLORIDE (MG/L)				DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)	
JAN	4.600	5.700	6.800	6.700	6.500	6.500	
FEB	5.100	6.700	6.900	6.900	6.900	6.800	
MAR	4.900	6.800	6.800	6.700	6.700	6.700	
APR	!LA	!LA	!LA	!LA	!LA	!LA	
MAY	3.900	5.300	5.400	5.400	5.400	5.300	
JUN	3.000	4.100	4.500	4.300	4.300	4.300	
JUL	2.300	3.400	3.500	3.600	3.500	3.400	
AUG	3.300	5.400	5.600	5.500	5.200	5.500	
SEP	3.000	4.900	4.800	4.800	5.300	4.800	
OCT	5.000	6.600	6.900	6.400	6.800	6.800	
NOV	4.000	4.600	5.100	5.200	5.100	4.800	
DEC	3.500	4.400	4.400	4.400	4.500	4.400	
COLOUR (HZU)				DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)	
JAN	42.000	9.500	10.500	9.500	9.500	8.000	
FEB	40.000	5.500	6.000	5.500	6.500	6.000	
MAR	36.000	5.000	5.000	4.500	6.000	6.000	
APR	!LA	!LA	!LA	!LA	!LA	!LA	
MAY	37.500	3.500	4.000	4.000	4.500	4.500	
JUN	31.500	3.000	3.500	3.000	3.500	3.500	
JUL	29.000	2.500	3.000	3.000	3.500	4.500	
AUG	27.000	5.500	4.500	3.500	5.500	4.000	
SEP	22.500	3.500	3.000	3.000	3.500	3.500	
OCT	28.500	2.500	3.500	4.000	4.000	4.500	
NOV	40.000	4.500	9.000	4.000	4.500	4.000	
DEC	41.000	4.000	4.500	4.500	4.500	4.500	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CONDUCTIVITY (UMHO/CM)		DET'N LIMIT = 1.		GUIDELINE = 400 (F2)			
JAN	86	136	139	139	138	139	139
FEB	101	152	149	148	149	149	149
MAR	104	147	159	159	156	156	156
APR	!LA	!LA	!LA	!LA	!LA	!LA	!LA
MAY	95	136	146	144	143	143	145
JUN	75	122	126	124	124	124	124
JUL	69	112	118	118	116	116	115
AUG	91	132	127	130	136	136	134
SEP	73	117	122	123	122	122	122
OCT	104	147	151	154	149	149	149
NOV	102	153	159	159	157	157	157
DEC	94	147	145	144	147	147	144
DISS ORG CARBON (MG/L)		DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)			
JAN	6.500	3.600	3.900	3.900	3.500	3.400	3.400
FEB	6.600	3.400	3.400	3.400	3.400	3.200	3.200
MAR	6.300	3.400	3.200	3.100	2.900	2.900	2.900
APR	!LA	!LA	!LA	!LA	!LA	!LA	!LA
MAY	6.000	2.900	3.200	2.800	2.800	2.800	2.800
JUN	5.700	2.500	2.900	2.500	2.600	2.400	2.400
JUL	5.700	2.800	2.700	2.700	2.700	2.600	2.600
AUG	5.700	3.400	3.100	2.900	3.200	2.900	2.900
SEP	5.200	2.800	2.500	2.300	2.400	2.500	2.500
OCT	5.700	2.900	2.900	2.800	2.800	2.800	2.800
NOV	6.600	2.900	2.900	2.900	2.800	2.800	2.800
DEC	6.200	2.600	2.800	2.700	2.600	2.600	2.600
FLUORIDE (MG/L)		DET'N LIMIT = 0.01		GUIDELINE = 1.5 (A1)			
JAN	.040 <T	.800	.920	.920	.920	.900	.900
FEB	.060	.820	.980	1.000	.960	.940	.940
MAR	.040 <T	1.100	1.080	1.100	1.000	1.000	1.000
APR	!LA	!LA	!LA	!LA	!LA	!LA	!LA
MAY	.040	1.040	.980	1.020	.940	.960	.960
JUN	.040 <T	.920	.900	.920	.940	.900	.900
JUL	.040 <T	.920	1.080	1.080	.980	.980	.980
AUG	.060	1.000	1.080	1.080	1.100	1.080	1.080
SEP	.020 <T	.980	1.200	1.180	1.160	1.180	1.180
OCT	.060	.600	.640	.620	.660	.660	.660
NOV	.020 <T	.860	.840	.880	.860	.820	.820
DEC	.060	.860	.920	.880	1.000	.920	.920
HARDNESS (MG/L)		DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)			
JAN	37.300	56.300	56.500	54.900	55.700	55.600	55.600
FEB	42.000	59.000	56.000	55.000	55.000	54.000	54.000
MAR	43.000	58.000	62.000	64.000	62.000	61.600	61.600
APR	!LA	!LA	!LA	!LA	!LA	!LA	!LA
MAY	37.300	52.100	55.200	55.300	55.600	54.400	54.400
JUN	30.000	49.000	50.000	50.000	50.000	49.000	49.000
JUL	32.000	46.000	52.000	48.000	50.000	46.000	46.000
AUG	39.700	50.400	48.600	48.200	48.700	48.600	48.600
SEP	26.400	45.300	45.700	46.300	45.600	45.800	45.800
OCT	39.800	55.000	57.500	57.800	56.500	58.100	58.100
NOV	40.900	56.000	56.000	55.000	56.000	55.000	55.000
DEC	35.000	52.000	51.000	53.000	54.000	52.000	52.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

SITE 2

		STANDING		FREE FLOW		STANDING		FREE FLOW	
IONCAL (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A					
JAN	14.160	8.607	11.310	9.715	9.101	10.780			
FEB	4.907	.158	.454	1.765	2.151	2.798			
MAR	6.596	4.927	2.791	5.108	4.231	1.921			
APR	.000	.000	.000	.000	.000	.000			
MAY	1.907	1.991	2.214	1.159	1.218	.965			
JUN	.374	2.635	3.552	4.252	4.252	4.402			
JUL	21.060	12.050	13.190	12.150	12.080	10.320			
AUG	9.484	.419	2.807	.809	4.870	4.557			
SEP	1.140	8.003	4.502	4.273	2.927	5.285			
OCT	4.834	1.958	2.020	.621	2.497	4.951			
NOV	8.598	.799	.027	2.255	1.314	1.414			
DEC	3.539	4.418	4.564	1.636	.961	1.642			
LANGELIERS INDEX (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A					
JAN	-1.314	-.985	-1.131	-1.118	-1.054	-1.073			
FEB	-1.023	-.825	-1.006	-.956	-.922	-.905			
MAR	-1.210	-1.067	-.799	-.835	-.804	-.825			
MAY	-1.133	-1.041	-.946	-.933	-.923	-.895			
JUN	-1.513	-1.160	-1.258	-1.259	-1.212	-1.199			
JUL	-1.555	-1.306	-1.089	-1.183	-1.165	-1.189			
AUG	-.631	-.808	-1.007	-.879	-.564	-.607			
SEP	-1.609	-1.271	-1.206	-1.149	-1.241	-1.216			
OCT	-1.178	-.850	-.929	-.750	-1.007	-.940			
NOV	-1.146	-.918	-.921	-.937	-.957	-.957			
DEC	-1.227	-.982	-1.004	-1.033	-1.033	-1.056			
MAGNESIUM (MG/L)		DET'N LIMIT = 0.1		GUIDELINE = 30 (F2)					
JAN	2.200	2.250	2.250	2.200	2.150	2.150			
FEB	2.700	2.600	2.600	2.500	2.500	2.400			
MAR	2.800	2.800	2.900	2.800	2.700	2.600			
APR	!LA	!LA	!LA	!LA	!LA	!LA			
MAY	2.400	2.450	2.500	2.600	2.500	2.600			
JUN	2.000	2.000	2.100	2.200	2.100	2.100			
JUL	2.100	2.000	2.000	2.000	2.100	1.900			
AUG	2.050	2.100	2.100	2.100	2.050	2.150			
SEP	1.850	1.900	1.900	1.850	1.900	1.750			
OCT	2.750	2.650	2.700	2.750	2.750	2.750			
NOV	2.900	2.900	3.000	3.000	3.000	3.100			
DEC	2.200	2.300	2.300	2.200	2.200	2.200			
SODIUM (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 200 (A4)					
JAN	3.700	4.200	5.100	5.100	4.900	5.000			
FEB	4.000	5.000	5.000	5.000	5.000	5.400			
MAR	4.000	5.200	5.400	5.400	5.400	4.600			
APR	!LA	!LA	!LA	!LA	!LA	!LA			
MAY	3.000	3.700	3.900	4.000	4.000	3.900			
JUN	2.400	2.800	3.400	3.200	3.200	3.200			
JUL	2.200	2.800	3.200	3.600	3.200	3.200			
AUG	3.200	3.900	3.900	3.700	3.800	3.800			
SEP	3.300	3.900	4.100	4.000	4.100	4.000			
OCT	4.600	5.200	5.200	5.300	5.200	5.500			
NOV	4.200	5.000	5.600	5.800	5.600	5.400			
DEC	3.400	4.800	4.600	4.600	4.800	4.600			

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
		STANDING		FREE FLOW		STANDING	
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)			
JAN	.036	BDL	.006 <T	.014	BDL	.002 <T	.012
FEB	.070	BDL	.012	.006 <T	.004 <T	.012	.012
MAR	.054	.004 <T	.012	BDL	BDL	.012	.012
APR	!LA	!LA	!LA	!LA	!LA	.012	.012
MAY	.012	BDL	.008 <T	BDL	BDL	.012	.012
JUN	BDL	BDL	.006 <T	BDL	BDL	.012	.012
JUL	.008 <T	BDL	BDL	BDL	BDL	.012	.012
AUG	.008 <T	.006 <T	.006 <T	.002 <T	.002 <T	.012	.012
SEP	BDL	BDL	BDL	BDL	BDL	.012	.012
OCT	BDL	.008 <T	.016	.014	.012	.012	.012
NOV	.008 <T	BDL	.006 <T	.002 <T	BDL	.012	.012
DEC	.012	.002 <T	.016	.002 <T	BDL	.012	.012
NITRITE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)			
JAN	.010	.004 <T	.003 <T	.004 <T	.003 <T	.003 <T	.003 <T
FEB	.013	.009	.008	.007	.007	.006	.006
MAR	.024	.020	.006	.004 <T	.004 <T	.004 <T	.004 <T
APR	!LA	!LA	!LA	!LA	!LA	.012	.012
MAY	.009	BDL	.001 <T	BDL	BDL	.012	.012
JUN	.005	.001 <T	.001 <T	BDL	.002 <T	.001 <T	.001 <T
JUL	.009	.002 <T	.002 <T	.002 <T	.003 <T	.002 <T	.002 <T
AUG	.005	.002 <T	.001 <T	.001 <T	.002 <T	.001 <T	.001 <T
SEP	.004 <T	.002 <T	.004 <T	.002 <T	.002 <T	.006	.006
OCT	.013	.002 <T	.001 <T	.002 <T	.002 <T	.001 <T	.001 <T
NOV	.014	.002 <T	.003 <T	.002 <T	.002 <T	.002 <T	.002 <T
DEC	.007	BDL	BDL	BDL	BDL	.012	.012
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)			
JAN	.320	.315	.320	.335	.315	.325	.325
FEB	.280	.270	.290	.285	.285	.275	.275
MAR	.295	.295	.275	.270	.270	.270	.270
APR	!LA	!LA	!LA	!LA	!LA	.012	.012
MAY	.180	.175	.175	.165	.165	.155	.155
JUN	.175	.170	.170	.170	.180	.175	.175
JUL	.175	.160	.165	.165	.160	.165	.165
AUG	.155	.155	.165	.165	.155	.160	.160
SEP	.205	.165	.170	.155	.160	.165	.165
OCT	.300	.295	.310	.310	.315	.310	.310
NOV	.345	.320	.330	.325	.325	.325	.325
DEC	.255	.245	.245	.240	.245	.245	.245
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.400	.220	.270	.310	.220	.240	.240
FEB	.390	.210	.250	.190	.200	.200	.200
MAR	.400	.170	.260	.160	.170	.180	.180
APR	!LA	!LA	!LA	!LA	!LA	.012	.012
MAY	BDL	BDL	.450	.390	.430	.450	.450
JUN	.310	.130	.270	.150	.140	.140	.140
JUL	.330	.170	.180	.160	.170	.170	.170
AUG	.350	.210	.240	.200	.200	.180	.180
SEP	.230	.110	.140	.110	.120	.120	.120
OCT	.300	.170	.200	.200	.240	.170	.170
NOV	.340	.160	.180	.130	.200	.150	.150
DEC	.280	.100	.160	.110	.110	.100	.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	7.630	7.710	7.580	7.610	7.660	7.650	
FEB	7.770	7.780	7.670	7.740	7.740	7.780	
MAR	7.570	7.580	7.760	7.710	7.760	7.740	
APR	!LA	!LA	!LA	!LA	!LA	!LA	
MAY	7.720	7.690	7.700	7.740	7.740	7.780	
JUN	7.550	7.650	7.550	7.560	7.580	7.610	
JUL	7.530	7.590	7.660	7.650	7.620	7.660	
AUG	8.160	7.880	7.750	7.860	8.130	8.090	
SEP	7.560	7.570	7.610	7.650	7.570	7.590	
OCT	7.670	7.820	7.720	7.870	7.660	7.710	
NOV	7.690	7.760	7.750	7.750	7.720	7.740	
DEC	7.680	7.710	7.700	7.660	7.650	7.650	
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A			
JAN	.005	.005	.	.	.	.
FEB	.001 <T	.001 <T	.	.	.	.
MAR	.001 <T	.002 <T	.	.	.	.
APR	!LA	!LA	.	.	.	.
MAY	.002	.002	.	.	.	.
JUN	.001 <T	.003	.	.	.	.
JUL	.003	.002 <T	.	.	.	.
AUG	.002 <T	.004	.	.	.	.
SEP	.001 <T	BDL	.	.	.	.
OCT	.003	.003	.	.	.	.
NOV	.006	.002	.	.	.	.
DEC	.004	.004	.	.	.	.
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)			
JAN	.018	.012	.	.	.	.
FEB	.017	.010	.	.	.	.
MAR	.017	.006 <T	.	.	.	.
APR	!LA	!LA	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	.018	.004 <T	.	.	.	.
JUL	.018	.003 <T	.	.	.	.
AUG	.013	.005	.	.	.	.
SEP	.012	BDL	.	.	.	.
OCT	.018	.004 <T	.	.	.	.
NOV	.022	.008 <T	.	.	.	.
DEC	.011	.010	.	.	.	.
SULPHATE (MG/L)		DET'N LIMIT = .200		GUIDELINE = 500 (A3)			
JAN	9.180	24.550	24.530	24.500	24.830	24.590	
FEB	10.390	27.520	27.630	27.760	27.440	27.600	
MAR	9.240	24.580	26.560	26.800	26.940	26.550	
APR	!SM	!LA	!LA	!LA	!LA	!LA	
MAY	9.300	24.030	25.820	25.760	25.520	25.810	
JUN	8.280	23.670	24.850	25.300	24.290	23.600	
JUL	7.810	21.090	21.560	22.040	21.580	21.410	
AUG	8.210	21.110	20.570	20.280	21.150	20.370	
SEP	7.840	19.160	20.680	20.660	20.520	20.150	
OCT	10.420	24.840	26.590	26.540	25.900	26.190	
NOV	10.090	28.680	28.690	29.100	29.100	29.320	
DEC	9.680	28.240	27.920	27.510	28.240	27.490	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1	(A1)	
JAN	2.600	1.720	2.600	1.970	1.510	1.120
FEB	2.900	.860	1.000	.760	1.200	.940
MAR	2.500	.560	1.060	.470	.950	.980
APR	1LA	1LA	1LA	1LA	1LA	1LA
MAY	5.300	.600	.940	.640	1.060	.510
JUN	6.800	.480	.990	.520	.780	.500
JUL	3.600	.370	.510	.360	.280	.590
AUG	3.500	.950	.930	.650	.810	.570
SEP	2.500	.520	.460	.420	.320	.370
OCT	2.600	.360	.470	.320	.530	.330
NOV	9.200	.840	.690	.560	.440	.430
DEC	7.700	.970	1.830	1.240	1.050	.940

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
						FREE FLOW	
METALS		DET'N LIMIT = 0.05		GUIDELINE = 50 (A1)			
SILVER (UG/L)							
JAN	BDL	BDL	.060 <T	BDL	.070 <T	BDL	BDL
FEB	BDL	BDL	BDL	!SM	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)			
JAN	100.000	700.000	900.000	710.000	470.000	340.000	
FEB	120.000	290.000	320.000	!SM	240.000	160.000	
MAR	96.000	130.000	210.000	120.000	75.000	85.000	
APR	440.000	49.000	92.000	61.000	82.000	48.000	
MAY	170.000	56.000	70.000	64.000	76.000	58.000	
JUN	160.000	110.000	220.000	160.000	110.000	120.000	
JUL	130.000	130.000	120.000	110.000	92.000	100.000	
AUG	130.000	430.000	250.000	200.000	250.000	240.000	
SEP	96.000	76.000	100.000	90.000	110.000	120.000	
OCT	95.000	64.000	77.000	80.000	63.000	60.000	
NOV	200.000	200.000	110.000	95.000	91.000	85.000	
DEC	200.000	240.000	360.000	320.000	210.000	200.000	
ARSENIC (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)			
JAN	.820 <T	.310 <T	.390 <T	.360 <T	.380 <T	.400 <T	
FEB	.790 <T	.300 <T	.210 <T	!SM	.270 <T	.270 <T	
MAR	.740 <T	BDL	BDL	BDL	.140 <T	.130 <T	
APR	.510 <T	.150 <T	.170 <T	.250 <T	.180 <T	.190 <T	
MAY	.550 <T	BDL	BDL	.110 <T	.150 <T	.140 <T	
JUN	.580 <T	.360 <T	.250 <T	.270 <T	.240 <T	.190 <T	
JUL	.700 <T	.340 <T	.370 <T	.370 <T	.300 <T	.330 <T	
AUG	.540 <T	.180 <T	.210 <T	BDL	.310 <T	.230 <T	
SEP	.560 <T	.150 <T	.320 <T	BDL	.110 <T	BDL	
OCT	.480 <T	.170 <T	.240 <T	.180 <T	.240 <T	.200 <T	
NOV	.920 <T	.320 <T	.340 <T	.200 <T	.340 <T	.210 <T	
DEC	.820 <T	.440 <T	.300 <T	.240 <T	.350 <T	.290 <T	
BARIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)			
JAN	18.000	16.000	17.000	16.000	16.000	15.000	
FEB	19.000	17.000	17.000	!SM	17.000	16.000	
MAR	18.000	15.000	15.000	15.000	15.000	14.000	
APR	23.000	16.000	16.000	16.000	15.000	15.000	
MAY	19.000	17.000	17.000	17.000	17.000	17.000	
JUN	18.000	17.000	17.000	17.000	16.000	16.000	
JUL	18.000	17.000	16.000	16.000	17.000	16.000	
AUG	17.000	16.000	15.000	17.000	13.000	15.000	
SEP	17.000	16.000	15.000	15.000	14.000	14.000	
OCT	17.000	15.000	15.000	15.000	15.000	15.000	
NOV	17.000	14.000	14.000	14.000	13.000	12.000	
DEC	18.000	15.000	15.000	14.000	15.000	13.000	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
BORON (UG/L)				DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
JAN	5.700 <T	5.500 <T	6.100 <T	5.500 <T	4.800 <T	5.000 <T	
FEB	6.400 <T	6.300 <T	6.200 <T	ISM	9.800 <T	6.400 <T	
MAR	6.600 <T	10.000 <T	12.000 <T	11.000 <T	10.000 <T	5.800 <T	
APR	8.400 <T	8.400 <T	8.200 <T	7.700 <T	7.800 <T	9.400 <T	
MAY	13.000 <T	15.000 <T	16.000 <T	8.200 <T	6.600 <T	9.000 <T	
JUN	7.100 <T	6.200 <T	8.000 <T	6.000 <T	6.500 <T	5.300 <T	
JUL	6.700 <T	6.800 <T	6.400 <T	6.800 <T	8.100 <T	6.100 <T	
AUG	8.000 <T	8.000 <T	8.800 <T	7.900 <T	7.400 <T	7.900 <T	
SEP	5.800 <T	5.500 <T	7.800 <T	5.300 <T	13.000 <T	5.800 <T	
OCT	7.900 <T	7.200 <T	9.900 <T	7.200 <T	8.800 <T	7.700 <T	
NOV	5.100 <T	5.700 <T	5.700 <T	5.900 <T	6.300 <T	5.000 <T	
DEC	6.500 <T	5.800 <T	7.300 <T	5.800 <T	6.100 <T	6.800 <T	
CADMIUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	BDL	BDL	.070 <T	BDL	
FEB	.150 <T	BDL	BDL	ISM	BDL	BDL	
MAR	BDL	BDL	BDL	BDL	.070 <T	BDL	
APR	BDL	BDL	BDL	BDL	BDL	BDL	
MAY	BDL	BDL	.190 <T	BDL	BDL	BDL	
JUN	BDL	BDL	BDL	BDL	BDL	BDL	
JUL	BDL	BDL	BDL	BDL	.060 <T	BDL	
AUG	BDL	.060 <T	BDL	BDL	.090 <T	BDL	
SEP	BDL	BDL	BDL	BDL	.070 <T	BDL	
OCT	BDL	BDL	BDL	BDL	BDL	BDL	
NOV	BDL	BDL	BDL	BDL	BDL	BDL	
DEC	BDL	BDL	BDL	BDL	BDL	BDL	
COBALT (UG/L)				DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.140 <T	.050 <T	.100 <T	.050 <T	.180 <T	.030 <T	
FEB	.190 <T	.120 <T	.140 <T	ISM	.170 <T	.100 <T	
MAR	.130 <T	.140 <T	.130 <T	.100 <T	.100 <T	.090 <T	
APR	.390 <T	.120 <T	.120 <T	.120 <T	.120 <T	.170 <T	
MAY	.150 <T	.140 <T	.130 <T	.070 <T	.110 <T	.130 <T	
JUN	.240 <T	.150 <T	.230 <T	.200 <T	.170 <T	.150 <T	
JUL	.140 <T	.100 <T	.100 <T	.170 <T	.140 <T	.100 <T	
AUG	BDL	BDL	BDL	BDL	BDL	BDL	
SEP	.130 <T	.080 <T	.070 <T	.080 <T	.100 <T	.100 <T	
OCT	.110 <T	.100 <T	.090 <T	.090 <T	.110 <T	.110 <T	
NOV	.200 <T	.120 <T	.140 <T	.080 <T	.120 <T	.060 <T	
DEC	.160 <T	.040 <T	.050 <T	BDL	BDL	BDL	
CHROMIUM (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	BDL	1.900 <T	2.600 <T	1.700 <T	1.200 <T	.760 <T	
FEB	BDL	BDL	.600 <T	ISM	BDL	BDL	
MAR	BDL	.990 <T	1.300 <T	1.100 <T	.810 <T	BDL	
APR	1.300 <T	BDL	BDL	BDL	BDL	BDL	
MAY	.820 <T	.630 <T	.640 <T	BDL	BDL	BDL	
JUN	.880 <T	BDL	.800 <T	BDL	BDL	BDL	
JUL	.660 <T	BDL	BDL	BDL	BDL	BDL	
AUG	.890 <T	1.200 <T	.850 <T	.790 <T	.850 <T	.690 <T	
SEP	BDL	.590 <T	BDL	BDL	BDL	BDL	
OCT	.990 <T	.520 <T	.950 <T	.560 <T	BDL	.820 <T	
NOV	.820 <T	.680 <T	BDL	BDL	BDL	BDL	
DEC	.830 <T	.540 <T	1.300 <T	.770 <T	.540 <T	.890 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)			
JAN	2.000 <T	1.400 <T	49.000	7.100	110.000	16.000	
FEB	2.400 <T	1.100 <T	53.000	ISM	93.000	27.000	
MAR	1.600 <T	.910 <T	38.000	6.400	710.000	21.000	
APR	2.700 <T	2.200 <T	23.000	5.100	66.000	14.000	
MAY	1.800 <T	1.000 <T	31.000	8.600	82.000	46.000	
JUN	1.700 <T	.700 <T	29.000	9.200	94.000	25.000	
JUL	1.900 <T	.820 <T	29.000	7.800	71.000	14.000	
AUG	1.600 <T	.920 <T	20.000	5.400	110.000	20.000	
SEP	1.700 <T	.980 <T	23.000	6.400	84.000	14.000	
OCT	1.600 <T	.850 <T	32.000	6.600	51.000	22.000	
NOV	2.000 <T	1.100 <T	28.000	6.200	41.000	17.000	
DEC	1.700 <T	1.200 <T	22.000	3.400 <T	77.000	12.000	
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)			
JAN	210.000	77.000	110.000	78.000	87.000	55.000 <T	
FEB	200.000	42.000 <T	49.000 <T	ISM	70.000	44.000 <T	
MAR	200.000	31.000 <T	66.000	34.000 <T	56.000 <T	110.000	
APR	600.000	50.000 <T	77.000	46.000 <T	150.000	93.000	
MAY	250.000	21.000 <T	35.000 <T	23.000 <T	72.000	38.000 <T	
JUN	260.000	41.000 <T	77.000	48.000 <T	59.000 <T	63.000	
JUL	230.000	35.000 <T	53.000 <T	26.000 <T	58.000 <T	130.000	
AUG	200.000	59.000 <T	30.000 <T	22.000 <T	61.000	27.000 <T	
SEP	190.000	26.000 <T	26.000 <T	20.000 <T	21.000 <T	42.000 <T	
OCT	180.000	22.000 <T	59.000 <T	56.000 <T	67.000	52.000 <T	
NOV	330.000	58.000 <T	66.000	48.000 <T	60.000 <T	54.000 <T	
DEC	340.000	65.000	110.000	80.000	87.000	88.000	
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)			
JAN	.050 <T	.050 <T	.	.	.	.
FEB	BDL	BDL	.	.	.	.
MAR	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	.090 <T	.	.	.	.
NOV	.080 <T	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)			
JAN	20.000	15.000	18.000	14.000	13.000	11.000	
FEB	14.000	15.000	16.000	ISM	15.000	14.000	
MAR	15.000	16.000	19.000	15.000	14.000	14.000	
APR	24.000	16.000	20.000	16.000	19.000	17.000	
MAY	21.000	16.000	15.000	13.000	16.000	13.000	
JUN	23.000	16.000	18.000	14.000	13.000	12.000	
JUL	20.000	12.000	13.000	7.900	9.700	11.000	
AUG	20.000	13.000	7.000	6.300	8.200	6.500	
SEP	18.000	10.000	7.800	5.600	6.400	6.000	
OCT	9.600	7.700	8.400	7.700	8.400	7.400	
NOV	15.000	9.000	9.100	7.900	7.600	7.200	
DEC	19.000	10.000	13.000	8.300	9.000	9.800	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	.260 <T	.180 <T	.170 <T	.160 <T	.170 <T	.130 <T	
FEB	.260 <T	.270 <T	.250 <T	ISM	.260 <T	.240 <T	
MAR	.210 <T	.230 <T	.260 <T	.220 <T	.220 <T	.230 <T	
APR	.160 <T	.210 <T	.240 <T	.230 <T	.190 <T	.280 <T	
MAY	.180 <T	.220 <T	.190 <T	.210 <T	.190 <T	.190 <T	
JUN	.130 <T	.100 <T	.120 <T	.130 <T	.130 <T	.100 <T	
JUL	.200 <T	.150 <T	.190 <T	.180 <T	.170 <T	.170 <T	
AUG	.200 <T	.330 <T	.180 <T	.180 <T	.220 <T	.160 <T	
SEP	.190 <T	.240 <T	.200 <T	.180 <T	.210 <T	.230 <T	
OCT	.300 <T	.300 <T	.290 <T	.290 <T	.310 <T	.320 <T	
NOV	.160 <T	.270 <T	.240 <T	.240 <T	.230 <T	.240 <T	
DEC	.200 <T	.180 <T	.230 <T	.170 <T	.300 <T	.640	
NICKEL (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)			
JAN	.400 <T	BDL	3.100	BDL	BDL	BDL	
FEB	2.200	1.500 <T	3.400	ISM	1.700 <T	1.400 <T	
MAR	.530 <T	BDL	.350 <T	BDL	2.000 <T	BDL	
APR	.610 <T	BDL	.720 <T	BDL	BDL	.450 <T	
MAY	.600 <T	.300 <T	.270 <T	.230 <T	.990 <T	.790 <T	
JUN	.540 <T	BDL	.600 <T	BDL	2.400	.270 <T	
JUL	.510 <T	.280 <T	4.300	.270 <T	.970 <T	BDL	
AUG	.480 <T	BDL	.590 <T	BDL	BDL	BDL	
SEP	.390 <T	BDL	1.500 <T	BDL	2.900	BDL	
OCT	.340 <T	BDL	.230 <T	BDL	.430 <T	BDL	
NOV	.880 <T	.530 <T	.280 <T	.390 <T	.590 <T	.290 <T	
DEC	.700 <T	BDL	BDL	BDL	BDL	BDL	
LEAD (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 10. (A1)			
JAN	.220 <T	.110 <T	.850	.220 <T	3.800	.260 <T	
FEB	.490 <T	.090 <T	.800	ISM	2.500	.350 <T	
MAR	.240 <T	BDL	.740	.100 <T	4.200	.340 <T	
APR	.460 <T	1.200	.450 <T	.120 <T	4.200	.150 <T	
MAY	.340 <T	BDL	.690	.130 <T	3.400	.510	
JUN	.540	.080 <T	.770	.240 <T	1.800	.430 <T	
JUL	.570	BDL	1.600	.340 <T	2.100	.390 <T	
AUG	.460 <T	.130 <T	.680	.290 <T	3.300	.700	
SEP	.500 <T	.080 <T	.800	.320 <T	4.500	.550	
OCT	.300 <T	.140 <T	.810	.200 <T	2.300	.530	
NOV	.410 <T	.060 <T	.630	.130 <T	1.500	.330 <T	
DEC	.350 <T	.120 <T	.590	.130 <T	6.200	.270 <T	
ANTIMONY (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)			
JAN	.230 <T	.400 <T	.290 <T	.290 <T	1.100	.300 <T	
FEB	.440 <T	.520	.520	ISM	.660	.590	
MAR	.380 <T	.490 <T	.360 <T	.380 <T	.480 <T	.410 <T	
APR	.240 <T	.380 <T	.400 <T	.430 <T	.400 <T	.470 <T	
MAY	.270 <T	.290 <T	.360 <T	.300 <T	.390 <T	.340 <T	
JUN	.310 <T	.330 <T	.390 <T	.320 <T	.310 <T	.370 <T	
JUL	.280 <T	.370 <T	.410 <T	.530	.510	.360 <T	
AUG	.260 <T	.340 <T	.300 <T	.370 <T	.410 <T	.410 <T	
SEP	.280 <T	.280 <T	.350 <T	.430 <T	.420 <T	.420 <T	
OCT	.320 <T	.440 <T	.370 <T	.450 <T	.550	.420 <T	
NOV	.270 <T	.440 <T	.480 <T	.480 <T	.520	.510	
DEC	.410 <T	.470 <T	.440 <T	.460 <T	.590	.610	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
STRONTIUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = N/A			
JAN	48.000	59.000	60.000	59.000		57.000	54.000
FEB	58.000	70.000	67.000	ISM		69.000	67.000
MAR	54.000	62.000	67.000	66.000		65.000	65.000
APR	69.000	79.000	78.000	78.000		79.000	80.000
MAY	54.000	61.000	65.000	64.000		64.000	63.000
JUN	44.000	53.000	54.000	54.000		53.000	52.000
JUL	42.000	52.000	55.000	54.000		53.000	52.000
AUG	48.000	60.000	58.000	57.000		56.000	56.000
SEP	47.000	56.000	60.000	58.000		57.000	57.000
OCT	64.000	72.000	74.000	73.000		72.000	73.000
NOV	57.000	67.000	69.000	69.000		69.000	65.000
DEC	55.000	66.000	66.000	65.000		70.000	67.000
TITANIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = N/A			
JAN	8.800	6.900	8.500	7.200		6.200	5.900
FEB	9.400	8.000	6.900	ISM		7.000	6.500
MAR	7.900	6.700	8.200	6.400		5.900	6.000
APR	25.000	5.500	6.600	5.600		6.000	6.000
MAY	12.000	6.300	6.900	7.200		6.400	6.200
JUN	19.000	11.000	12.000	11.000		11.000	10.000
JUL	11.000	5.600	6.400	5.700		5.600	5.100
AUG	16.000	10.000	9.700	9.700		8.800	8.800
SEP	12.000	8.100	9.600	8.900		7.800	8.200
OCT	9.600	5.800	6.200	5.700		5.900	5.800
NOV	15.000	6.900	7.300	6.500		6.000	5.900
DEC	20.000	12.000	14.000	12.000		11.000	11.000
URANUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 100 (A1)			
JAN	.100 <T	BDL	BDL	BDL		BDL	BDL
FEB	.140 <T	BDL	BDL	ISM		BDL	BDL
MAR	.070 <T	BDL	BDL	BDL		BDL	BDL
APR	.170 <T	BDL	BDL	BDL		BDL	BDL
MAY	.120 <T	BDL	BDL	BDL		BDL	BDL
JUN	.090 <T	BDL	BDL	BDL		BDL	BDL
JUL	.060 <T	BDL	BDL	BDL		BDL	BDL
AUG	.090 <T	BDL	BDL	BDL		BDL	BDL
SEP	.060 <T	BDL	BDL	BDL		BDL	BDL
OCT	.150 <T	BDL	BDL	BDL		BDL	BDL
NOV	.140 <T	BDL	BDL	BDL		BDL	BDL
DEC	.130 <T	BDL	BDL	BDL		BDL	BDL
VANADIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	.480 <T	1.300	1.400	1.400		1.100	1.100
FEB	.640	1.100	1.200	ISM		1.000	.890
MAR	.430 <T	.880	.910	.840		.540	.700
APR	1.400	.850	.970	.850		.970	.700
MAY	.630	.760	.740	.750		.750	.720
JUN	.700	.770	.790	.730		.670	.710
JUL	.690	.920	1.000	.900		.850	.830
AUG	.730	1.200	.990	.900		1.000	.950
SEP	.580	1.000	1.100	.980		.930	.990
OCT	.590	.830	.880	.890		.740	.740
NOV	.750	.590	.600	.540		.520	.490 <T
DEC	.680	.590	.600	.590		.700	.580

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

ZINC (UG/L)	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
			DET'N LIMIT = 0.2	GUIDELINE = 5000 (A3)		
JAN	5.500	4.400	9.600	3.600	12.000	2.900
FEB	7.500	5.000	11.000	ISM	13.000	4.200
MAR	5.700	4.200	8.700	3.100	49.000	6.200
APR	6.000	4.300	5.600	2.900	8.200	3.700
MAY	5.000	3.500	6.800	2.400	10.000	7.500
JUN	5.600	4.600	10.000	4.000	15.000	5.700
JUL	4.200	3.900	7.800	2.900	12.000	3.700
AUG	3.400	2.400	4.700	2.300	14.000	3.800
SEP	3.900	3.000	8.000	3.000	23.000	3.600
OCT	3.000	4.400	8.100	3.200	13.000	4.500
NOV	5.100	4.300	7.400	4.400	10.000	4.600
DEC	4.700	11.000	6.000	3.800	9.500	10.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW			TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS							
HEXACHLOROCYCLOPENTADIENE (NG/L)				DET'M LIMIT = 5.000		GUIDELINE = 206000 (D4)	
OCT	BDL	65.000	.	.	20.000 <T	.	40.000 <T
NOV	BDL	BDL	.	.	BDL	.	BDL
DEC	BDL	10.000 <T	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
POLYAROMATIC HYDROCARBONS						
PHENANTHRENE (NG/L)		DET'N LIMIT = 10.		GUIDELINE = N/A		
JAN	BDL	BDL	.	.	.	.
FEB	BDL	BDL	.	.	.	.
MAR	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
MAY	!QU	!QU	.	.	.	.
JUN	80.000 <T	BDL	.	.	.	.
JUL	!QU	!QU	.	.	.	.
AUG	25.000 <T	BDL	.	.	.	.
SEP	BDL	BDL	.	BDL	.	BDL
OCT	50.000 <T	BDL	.	.	.	.
NOV	10.000 <T	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
PESTICIDES & PCB		DET'N LIMIT = 1.000		GUIDELINE = 700 (G)			
ALPHA BHC (NG/L))						
JAN	BDL	BDL	.	BDL	.	BDL	BDL
FEB	1.000 <T	1.000 <T	.	BDL	.	BDL	BDL
MAR	!LA	!LA	.	!LA	.	!IS	!IS
APR	BDL	BDL	.	BDL	.	BDL	BDL
MAY	BDL	BDL	.	1.000 <T	.	1.000 <T	1.000 <T
JUN	BDL	3.000 <T	.	2.000 <T	.	BDL	BDL
JUL	BDL	1.000 <T	.	BDL	.	BDL	BDL
AUG	!LA	BDL	.	BDL	.	BDL	BDL
SEP	BDL	BDL	.	BDL	.	BDL	BDL
OCT	BDL	BDL	.	BDL	.	BDL	BDL
NOV	1.000 <T	1.000 <T	.	1.000 <T	.	BDL	BDL
DEC	BDL	BDL	.	.	.	.	.
ATRAZINE (NG/L)		DET'N LIMIT = 50		GUIDELINE = 60000 (A2)			
JAN	BDL	BDL	.	.	.	.	.
FEB	BDL	BDL	.	.	.	.	.
MAR	BDL	BDL	.	.	.	.	.
APR	BDL	BDL	.	.	.	.	.
MAY	BDL	BDL	.	.	.	.	.
JUN	80.000 <T	BDL	.	.	.	.	.
JUL	BDL	BDL	.	.	.	.	.
AUG	BDL	80.000 <T	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.
OCT	70.000 <T	BDL	.	.	.	.	.
NOV	BDL	BDL	.	.	.	.	.
DEC	BDL	BDL	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L)		PHENOLICS)	DET'N LIMIT = .200		GUIDELINE = 2 (A4)	
JAN	1.600	1.000	.	.	.	.
FEB	1.000	.800 <T	.	.	.	.
MAR	2.600	1.200	.	.	.	.
APR	BDL	.400 <T	.	.	.	.
MAY	BDL	.400 <T	.	.	.	.
JUN	.600 <T	.600 <T	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	.400 <T	.400 <T	.	.	.	.
OCT	1.000 <T	.600 <T	.	.	.	.
NOV	2.000	1.000	.	.	.	.
DEC	1.200	1.000	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2			
		STANDING		FREE FLOW		STANDING		FREE FLOW	
<hr/>									
VOLATILES		DET'N LIMIT = 0.05				GUIDELINE = 5 (A1)			
BENZENE (UG/L)									
JAN	BDL	BDL	.	BDL	.	BDL			
FEB	BDL	BDL	.	!EF	.	BDL			
MAR	BDL	.100 <T	.	.050 <T	.	.050 <T			
APR	BDL	BDL	.	BDL	.	BDL			
MAY	BDL	BDL	.	BDL	.	BDL			
JUN	BDL	BDL	.	BDL	.	BDL			
JUL	BDL	BDL	.	BDL	.	BDL			
AUG	BDL	BDL	.	BDL	.	BDL			
SEP	BDL	BDL	.	BDL	.	BDL			
OCT	BDL	BDL	.	BDL	.	BDL			
NOV	BDL	BDL	.	BDL	.	BDL			
DEC	BDL	BDL	.	BDL	.	BDL			
<hr/>									
TOLUENE (UG/L)		DET'N LIMIT = 0.05				GUIDELINE = 24 (A3)			
JAN	BDL	BDL	.	BDL	.	BDL			
FEB	BDL	.050 <T	.	!EF	.	BDL			
MAR	.050 <T	BDL	.	BDL	.	BDL			
APR	BDL	.200 <T	.	BDL	.	BDL			
MAY	BDL	BDL	.	BDL	.	BDL			
JUN	BDL	BDL	.	BDL	.	BDL			
JUL	BDL	BDL	.	BDL	.	BDL			
AUG	BDL	BDL	.	BDL	.	BDL			
SEP	BDL	BDL	.	BDL	.	BDL			
OCT	BDL	BDL	.	BDL	.	BDL			
NOV	BDL	BDL	.	BDL	.	BDL			
DEC	BDL	BDL	.	BDL	.	BDL			
<hr/>									
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05				GUIDELINE = 2.4 (A3)			
JAN	BDL	BDL	.	BDL	.	BDL			
FEB	BDL	BDL	.	!EF	.	BDL			
MAR	BDL	.200 <T	.	.100 <T	.	.100 <T			
APR	BDL	.050 <T	.	.100 <T	.	.150 <T			
MAY	BDL	.100 <T	.	.050 <T	.	.100 <T			
JUN	BDL	.050 <T	.	.050 <T	.	.100 <T			
JUL	BDL	BDL	.	BDL	.	BDL			
AUG	BDL	.100 <T	.	.150 <T	.	.050 <T			
SEP	BDL	BDL	.	BDL	.	BDL			
OCT	BDL	.100 <T	.	BDL	.	.050 <T			
NOV	BDL	.100 <T	.	.100 <T	.	.050 <T			
DEC	BDL	BDL	.	BDL	.	BDL			
<hr/>									
P-XYLENE (UG/L)		DET'N LIMIT = 0.10				GUIDELINE = 300 (A3*)			
JAN	BDL	BDL	.	BDL	.	BDL			
FEB	BDL	BDL	.	!EF	.	BDL			
MAR	BDL	BDL	.	BDL	.	BDL			
APR	BDL	.100 <T	.	BDL	.	BDL			
MAY	BDL	BDL	.	BDL	.	BDL			
JUN	BDL	BDL	.	BDL	.	BDL			
JUL	BDL	BDL	.	BDL	.	BDL			
AUG	BDL	BDL	.	BDL	.	BDL			
SEP	BDL	BDL	.	BDL	.	BDL			
OCT	BDL	BDL	.	BDL	.	BDL			
NOV	BDL	BDL	.	BDL	.	BDL			
DEC	BDL	BDL	.	BDL	.	BDL			
<hr/>									

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
O-XYLENE (UG/L)			DET'M LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	.050 <T	.	BDL
FEB	.050 <T	BDL	.	!EF	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	.050 <T	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'M LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	BDL	.350 <T	.	.150 <T	.	.100 <T
FEB	.050 <T	.150 <T	.	!EF	.	.150 <T
MAR	.050 <T	.250 <T	.	.200 <T	.	.250 <T
APR	BDL	.200 <T	.	.150 <T	.	.300 <T
MAY	BDL	.200 <T	.	.100 <T	.	.250 <T
JUN	BDL	.150 <T	.	.150 <T	.	.150 <T
JUL	BDL	BDL	.	.100 <T	.	BDL
AUG	BDL	.250 <T	.	.250 <T	.	.150 <T
SEP	BDL	BDL	.	BDL	.	.050 <T
OCT	BDL	.150 <T	.	.100 <T	.	.150 <T
NOV	BDL	.250 <T	.	.200 <T	.	.150 <T
DEC	BDL	BDL	.	BDL	.	BDL
METHYLENE CHLORIDE (UG/L)			DET'M LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	!EF	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	19.500	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'M LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	.300 <T	39.000	.	29.800	.	29.300
FEB	.500 <T	28.100	.	!EF	.	28.600
MAR	.500 <T	41.300	.	32.000	.	27.300
APR	.100 <T	.200 <T	.	4.700	.	3.600
MAY	.100 <T	52.000	.	42.700	.	40.900
JUN	.100 <T	41.400	.	43.300	.	40.000
JUL	BDL	46.900	.	52.200	.	38.100
AUG	.200 <T	92.300	.	80.900	.	75.700
SEP	.200 <T	84.500	.	66.000	.	58.600
OCT	.200 <T	49.400	.	43.800	.	38.300
NOV	BDL	44.200	.	37.000	.	33.300
DEC	.100 <T	34.700	.	33.900	.	31.500

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)			
JAN	BDL	BDL	.	BDL	.	BDL	BDL
FEB	.060 <T	BDL	.	!EF	.	BDL	BDL
MAR	BDL	BDL	.	BDL	.	BDL	BDL
APR	BDL	.200 <T	.	BDL	.	BDL	BDL
MAY	BDL	BDL	.	BDL	.	BDL	BDL
JUN	BDL	BDL	.	BDL	.	BDL	BDL
JUL	BDL	BDL	.	BDL	.	BDL	BDL
AUG	BDL	BDL	.	BDL	.	BDL	BDL
SEP	BDL	BDL	.	BDL	.	BDL	BDL
OCT	BDL	BDL	.	BDL	.	BDL	BDL
NOV	BDL	BDL	.	BDL	.	BDL	BDL
DEC	BDL	BDL	.	BDL	.	BDL	BDL
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)			
JAN	BDL	1.150	.	1.100	.	1.050	1.050
FEB	BDL	1.500	.	!EF	.	1.450	1.450
MAR	BDL	1.900	.	1.750	.	1.500	1.500
APR	BDL	BDL	.	.300 <T	.	.250 <T	.250 <T
MAY	BDL	2.100	.	1.950	.	1.850	1.850
JUN	BDL	1.500	.	1.700	.	1.450	1.450
JUL	BDL	1.700	.	1.700	.	1.350	1.350
AUG	BDL	2.300	.	2.500	.	2.250	2.250
SEP	BDL	2.650	.	2.200	.	1.950	1.950
OCT	BDL	3.000	.	2.850	.	2.600	2.600
NOV	BDL	2.250	.	2.350	.	2.250	2.250
DEC	BDL	1.800	.	1.700	.	1.700	1.700
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)			
JAN	BDL	BDL	.	.100 <T	.	BDL	BDL
FEB	BDL	BDL	.	!EF	.	BDL	BDL
MAR	BDL	BDL	.	BDL	.	BDL	BDL
APR	BDL	BDL	.	BDL	.	BDL	BDL
MAY	BDL	BDL	.	BDL	.	BDL	BDL
JUN	BDL	BDL	.	BDL	.	BDL	BDL
JUL	BDL	BDL	.	BDL	.	BDL	BDL
AUG	BDL	BDL	.	BDL	.	BDL	BDL
SEP	BDL	BDL	.	BDL	.	BDL	BDL
OCT	BDL	.100 <T	.	.100 <T	.	.100 <T	.100 <T
NOV	BDL	BDL	.	.100 <T	.	.100 <T	.100 <T
DEC	BDL	BDL	.	BDL	.	BDL	BDL
T-CHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)			
JAN	.050 <T	BDL	.	.050 <T	.	.050 <T	.050 <T
FEB	BDL	BDL	.	!EF	.	BDL	BDL
MAR	BDL	BDL	.	BDL	.	BDL	BDL
APR	BDL	BDL	.	BDL	.	BDL	BDL
MAY	BDL	BDL	.	.050 <T	.	.050 <T	.050 <T
JUN	BDL	BDL	.	BDL	.	BDL	BDL
JUL	BDL	BDL	.	BDL	.	BDL	BDL
AUG	BDL	BDL	.	.050 <T	.	.050 <T	.050 <T
SEP	BDL	BDL	.	BDL	.	BDL	BDL
OCT	BDL	BDL	.	BDL	.	BDL	BDL
NOV	BDL	BDL	.	BDL	.	BDL	BDL
DEC	BDL	BDL	.	BDL	.	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
1,4 DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	1EF	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	.100 <T	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	.100 <T	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
JAN	BDL	40.100	.	31.000	.	30.300
FEB	BDL	29.650	.	1EF	.	30.050
MAR	.500 <T	43.200	.	33.750	.	28.800
APR	BDL	BDL	.	5.000 <T	.	3.800 <T
MAY	BDL	54.100	.	44.650	.	42.750
JUN	BDL	42.900	.	45.000	.	41.450
JUL	BDL	48.600	.	53.900	.	39.450
AUG	BDL	94.600	.	83.400	.	77.900
SEP	BDL	87.100	.	68.250	.	60.500
OCT	BDL	52.550	.	46.750	.	41.050
NOV	BDL	46.400	.	39.450	.	35.650
DEC	BDL	36.450	.	35.650	.	33.200

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	30000 (D3)
ATRAZONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDOT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPACINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLOROPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedance,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the MOE Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

PROGRAM INPUT - PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, the questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area;
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

PROGRAM INPUT - FIELD DATA

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

PROGRAM INPUT - LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

PROGRAM INPUT - PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

PROGRAM OUTPUT - QUERY

All DWSP information is easily accessed through the Query function. Therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH		METHOD: POCODO		UNIT: µg/L		
SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C₆H₆

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45);
MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M³/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI), (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide -500 mL plastic bottle (PET 500)
 -rinse bottle and cap three times
 -fill to 2 cm from top
 -add 10 drops sodium hydroxide (NaOH)
 (Caution: NaOH is corrosive)

Mercury -250 mL glass bottle
 -rinse bottle and cap three times
 -fill to top of label
 -add 20 drops each nitric acid (HNO_3)
 and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$)
 (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)

Phenols -250 mL glass bottle
 -do not rinse bottle, preservative
 has been added
 -fill to top of label

Radionuclides -4 L plastic jug
(as scheduled) -do not rinse, carrier added
 -fill to 5 cm from top

Organic Characterization -1 L amber glass bottle; instructions
(GC/MS - once per year) as per organic
 -250 mL glass bottle
 -do not rinse bottle
 -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid HNO_3
(Caution: HNO_3 is corrosive)

Volatiles (duplicate)
(OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact
with sample)
- do not rinse bottle, preservative
has been added
- fill bottle completely without
bubbles

Organics
(OWOC) (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total),
turbidity and pH on submission sheet.

